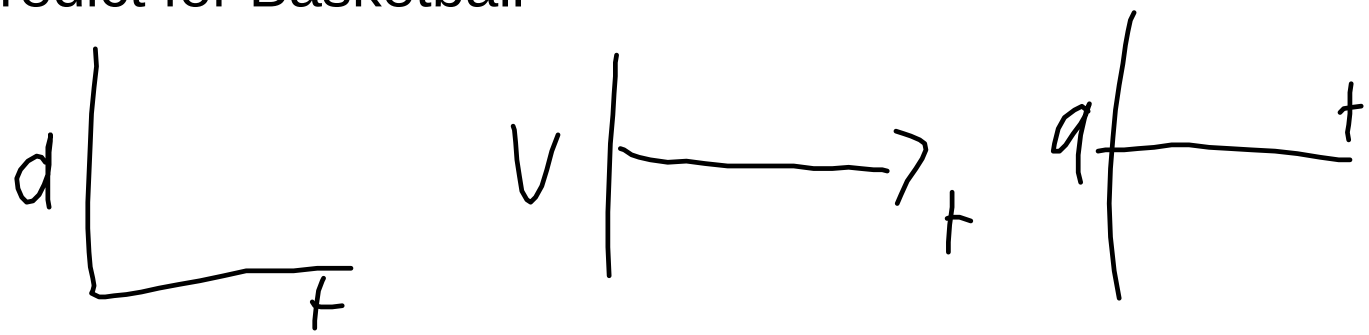
Hand in Cart Lab

predict the d-t, v-t, a-t graph for a basketball thrown up in the air above the motion sensor.
What if you throw a balloon instead?
movie clips:

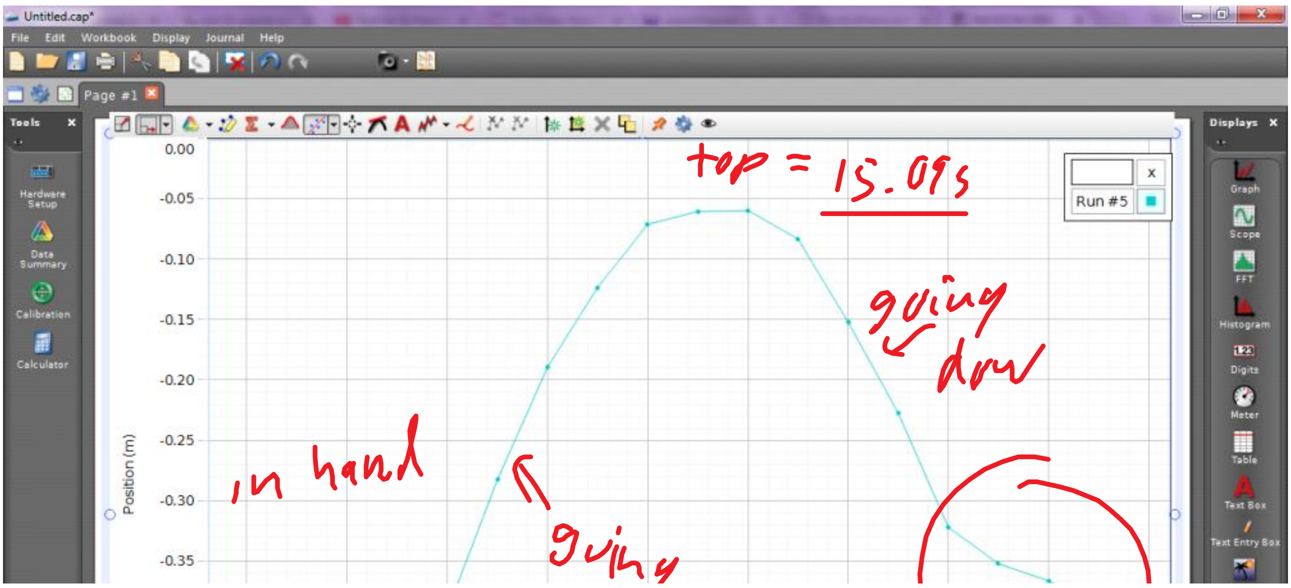
http://io9.gizmodo.com/you-know-how-this-experiment-ends-but-you-should-watch-1653628513?utm_campaign=socialflow_io9_facebook&utm_source=io9_facebook&utm_medium=socialflow

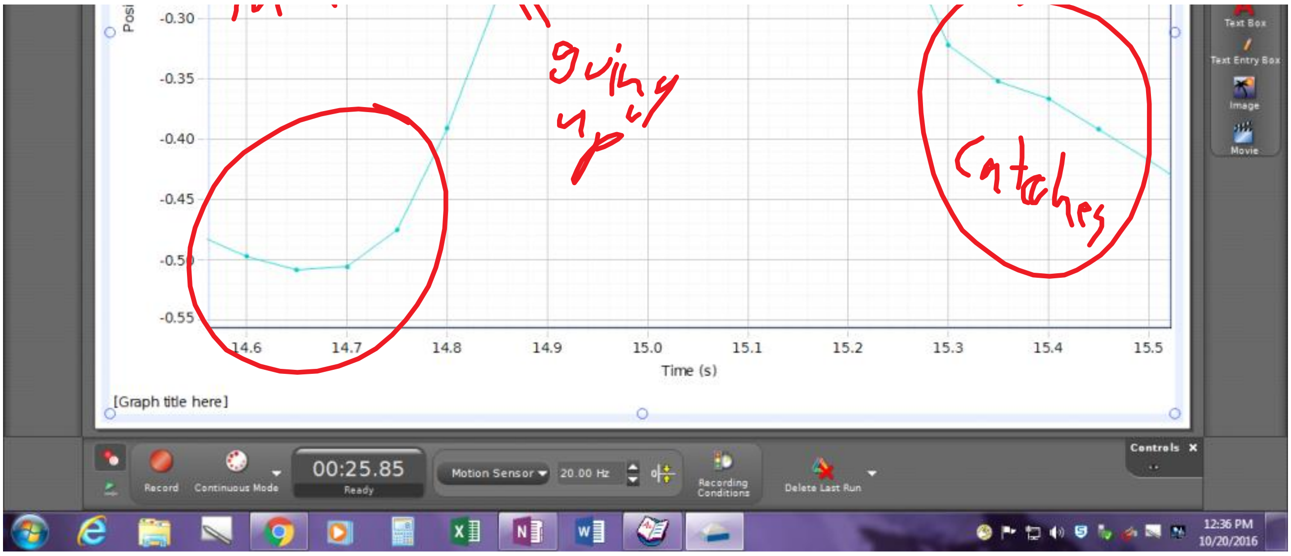
https://www.youtube.com/watch?v=5C5_dOEyAfk

predict for Basketball

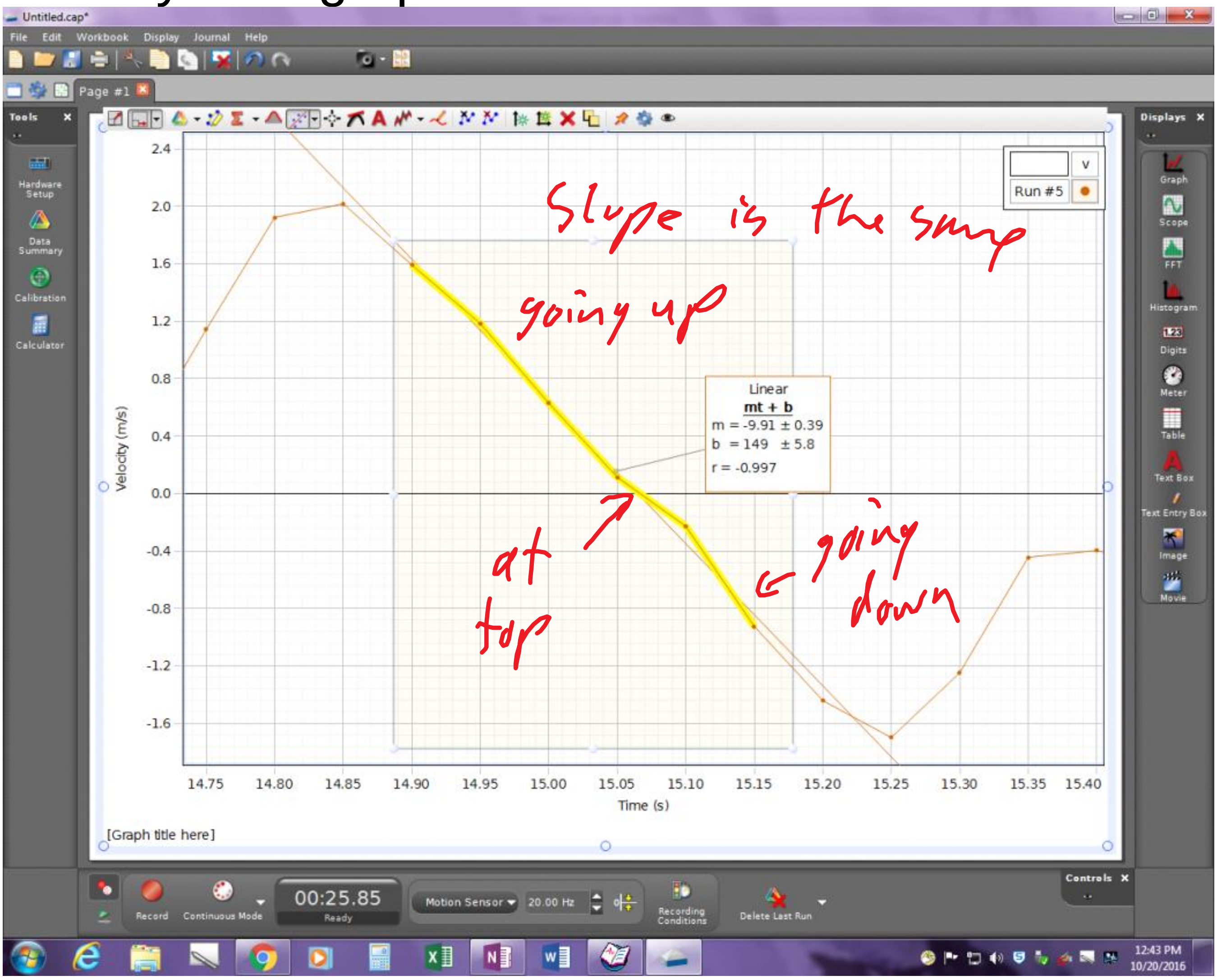


Charmaine threw the basketball up and the x-t data looks like:



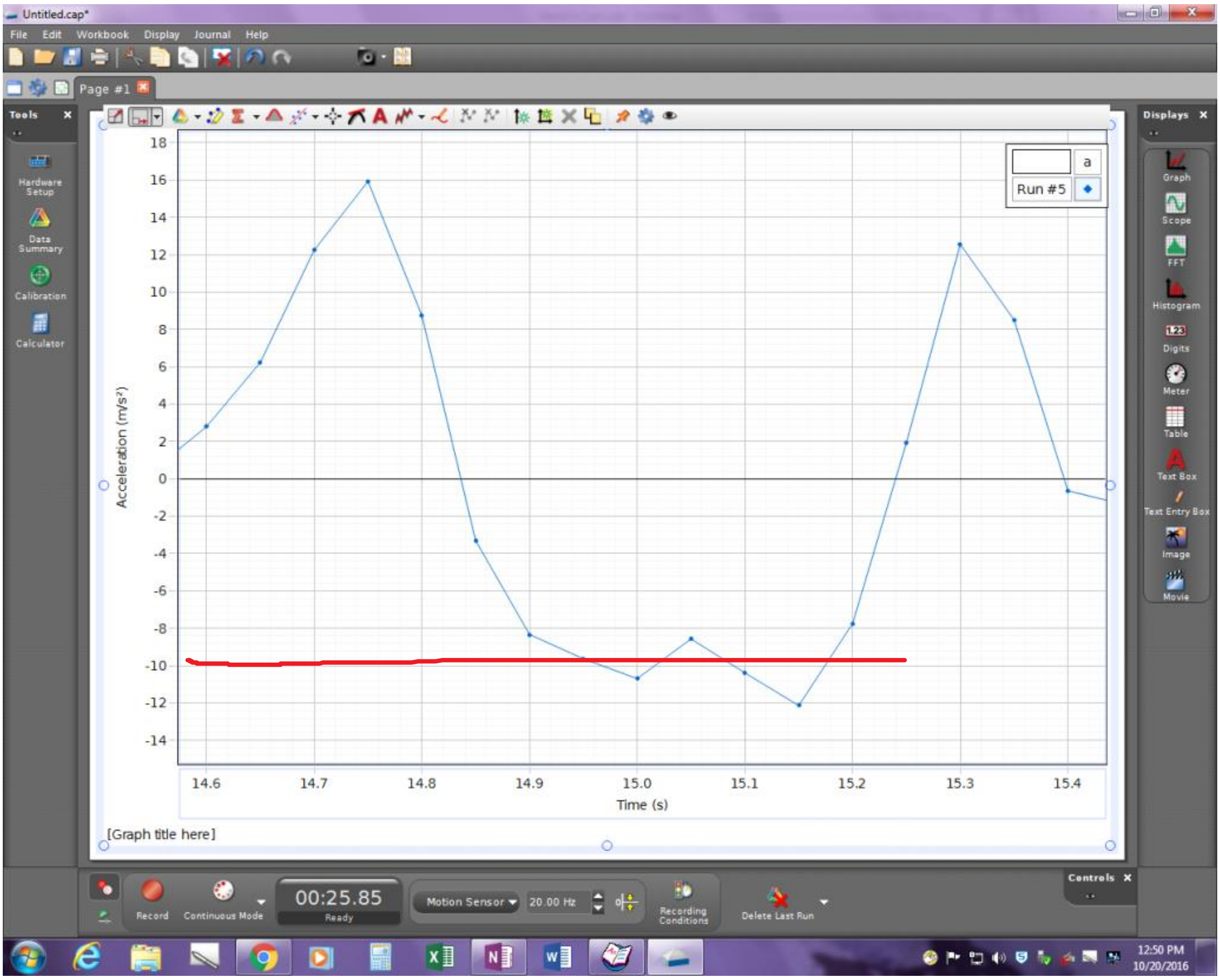


velocity-time graph

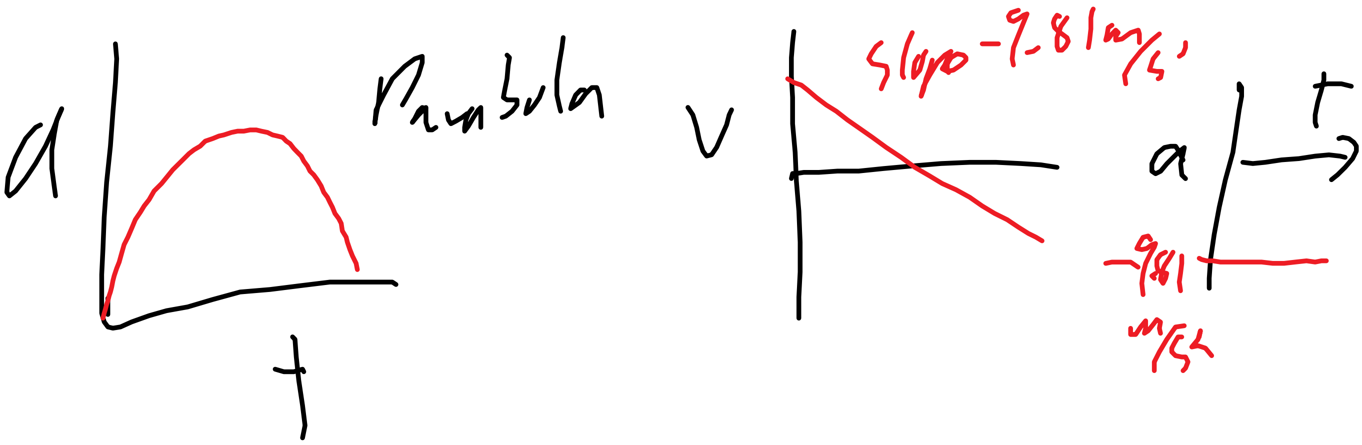


While the ball is in the air, the v-t graph is linear with a slope of -9.8 m/s^2 (graph gives 9.9 +/- 0.4 so 9.8 is within uncertainties)

acceleration - time graph:



While the ball is in the air, the acceleration is constantish at -9.81 m/s^2



predict the shape for a balloon

Objects accelerate at 9.81 m/s^2 if air resistance is negligible and near Earth.

eg. Charmaine throws the basketball up at 2.7 m/s. Determine

a) acceleration i)going up ii) at the top iii) going down
b) the maximum height
c) the time to get to maximum height
d) velocity i) at the top ii) when it returns to the same level it was thrown up
iii) at the ground 1.3m below the throw point.
e) answer all the questions again if Charmaine's on the moon $g=1.6m/s^2$

$y = mx + t$

max - min

+ max - min

v $\frac{max}{-min}$

$$V = 2.1 \pm \frac{max-min}{2} \quad t + 3.8 \pm 0.2$$

$? \quad 0.4 \, m/s^2 \qquad m/s$

$4 \pm 1 \, m/s$

b) $a = \text{slope} \sim 2 \, m/s^2$

c) $s = \frac{1}{2}(u+v)t = \frac{1}{2}(4+12)4$

$= \cancel{\quad}$ $\boxed{32m}$

d) $s = \frac{1}{2}at^2 + ut$

$s = \frac{1}{2}(2)(35)^2 + 4(35)$

$s = 1300 m$

2 $\quad u = 0 \quad v = 20 \, m/s \quad d = 3u$

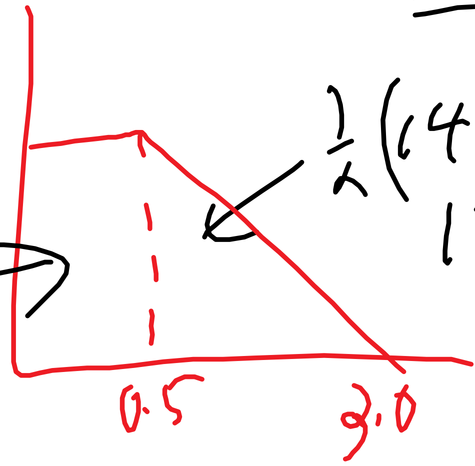
$\cancel{v^2 = u^2 + 2as} \qquad t = ?$

$s = \frac{1}{2}(v+u)t$

$k = (1.20)(\ldots$

$t = 0.30\,s$

3



14×0.5
$= 7m$

$\frac{1}{2}(14+0)2.5$
17.5

$50\,\frac{km}{h}\left(\frac{1000m}{km}\right)\left(\frac{h}{3600s}\right)$

b) $\frac{13.99\,m/s}{2.5\,s} = 5.6\,m/s^2$

c) $7.0m + 17.5m = 24.5m$

d) $V_{avg} = \frac{d_{total}}{t_{total}} = \frac{24.5}{3} = \boxed{8.0\,m/s}$